TECHNICAL NOTES

LAKE STATES FOREST EXPERIMENT STATION
U.S. DEPARTMENT OF AGRICULTURE · · FOREST SERVICE

No. 449

Nursery Root Disease Control by Soil Fumigation

For many years a root disease has caused serious mortality at the Chittenden Nursery near Wellston, Michigan. Eastern white pine (Pinus strobus L.), white spruce (Picea glauca (Moench.) Voss), and black spruce (P. mariana Mill.) are the only species attacked.

Above-ground symptoms first appear as stunting and chlorosis of affected trees. Later the needles turn brownish-red, and the trees die in an upright position. The root systems appear to rot away--the rootlets first, followed by the lower portion of the primary root. Trees of all ages, from 1-0 seedlings to 2-2 transplants, are affected, and mortality occurs throughout the nursery. Healthy trees and affected trees in all stages of decline appear to be intermixed at random.

Studies to control this disease have been carried on by the Lake States Forest Experiment Station since 1952. As a result of tests involving over 500,000 white pine seedlings, the following information has been obtained:

1. Methyl bromide[1/] applied at the rate of 2 lbs./100 sq. ft., supplemented with a Parzate (zinc ethylene bisdithiocarbamate) foliage spray, has increased production of seedlings by as much as 150 percent over that of untreated beds. Methyl bromide alone and methyl bromide plus Fermate (ferric dimethyl dithiocarbamate) sprays also show large increases in production.
2. Formaldehyde (40 percent commercial) applied at 1.5 oz./sq. ft., or about three times the dosage generally recommended for damping-off control, has given excellent control of the root disease, equal to or better than methyl bromide.
3. The use of methyl bromide and formaldehyde has resulted in heavier seedlings even though there was a denser stand in treated beds.

By the use of soil fumigants it may be possible to increase production per seedbed by as much as 100 percent. Even with increased density, the seedlings will still be of a size equal to or larger than those presently produced. With the cost of growing seedlings relatively fixed per seedbed, it may be possible to reduce the cost per thousand by a significant amount.

The cause of the root disease has not been proven by established pathological procedures. However, the evidence indicates that a fungus, a nematode, or a nematode-fungus complex is involved. At least 14 genera of nematodes are present in the Chittenden Nursery soil. Of these, at least 5 genera possibly could cause injury to white pine and spruce seedlings. Further studies are being carried on in an effort to isolate the pathogen or pathogens, and to test more completely the effects of soil fumigants. The results presented are based on seedbed studies. No results are available as yet on the ability of these treatments to reduce damage in the transplant beds.

1/ MC-2 (98 percent methyl bromide plus 2 percent chloropicrin), contributed by the Dow Chemical Company, Midland, Michigan.

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January 1956